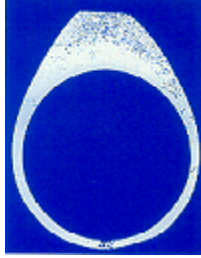


MELTING AND CASTING SOLUTIONS

Porosity - Prevention

The single biggest problem confronting the caster is porosity. By observing a few simple guidelines, porosity can be kept to a minimum



Vertical section of a cast ring showing a bad case of microporosity due to poor feeding of the molten metal. Severe shrinkage porosity at the sprue junction is due to a "hot spot"

Sprue Size:

As a general rule make the sprues at least as heavy as the heaviest section of the casting. Metal shrinks as it solidifies, and if additional molten metal is not available to fill in, a void will result. If the sprue is too thin, it will solidify before the casting, thereby cutting off the supply of molten metal to the still molten sections of the casting.

A common mistake is to have a large sprue that is necked down at the point it attaches to the cast piece. This restriction acts like a nozzle and the molten metal is sprayed into the mold. The sprue should be uniform in thickness up to the point where it is attached and there it should be flared in to insure a smooth and uniform flow of metal into the casting. Metal flow into the cast pieces should be as straight as possible.

Sprue Location:

Attach the sprue to the heaviest section of the casting. This allows the heavier section to be "fed" after the thinner sections have solidified. Multiple sprues are sometimes necessary if the casting has more than one heavy section.

Sprue Location:

Always place the heaviest pieces closest to the button and the lightest pieces at the other end, where there is more pressure to promote better filling. Also, the casting should not be placed too close to one another on the tree. When pieces are too close, localized heating of the investment results in poor heat extraction.

Melting Practice:

It is very important to protect the metal from oxidizing and absorbing unwanted gases. Protect the metal from contacting the air can be achieved many ways: a) with a fuel rich gas flame, b) with a protective inert gas such as nitrogen or argon, or c) by using flux.

Heating the metal to the proper temperature is a critical factor in obtaining good castings. When the metal is too cold, it freezes in the mold before completely filling it. When the metal is cast too hot, shrinkage porosity occurs in the heavier sections or immediately adjacent to them.

Overheating the metal causes base metals (primarily zinc) to be "burned off" or evaporated. As the base metals are lost, the percentage of gold (karat) increases. Each time, the alloy is reused, some of the special de-oxidizers are also lost. To minimize losses, keep close watch on metal temperature and always use at least 50% to 75% new alloy. We stringly discourage adding pure zinc or alloy to compensate for losses.